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Graphis nudanorsticta sp. nov. and two new records of *Graphis* spp. from China

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Abstract—Three lichen species are reported from China: *Graphis nudanorsticta* is proposed as a new species, while *G. caribica* and *G. contortuplicata* represent new records for China.

Key words—*Ascomycota*, *Lecanoromycetes, Ostropales*, *Graphidaceae*, taxonomy

Introduction

Ninety species of the lichen genus *Graphis* Adans. have been reported from China (Wei 1991; Aptroot & Seaward 1999; Aptroot & Sipman 2001; Aptroot & Sparrius 2003; Seaward & Aptroot 2005; Joshi & al. 2015; Jia & Wei 2011, 2016; Jia & Lücking 2017a,b). In this paper, following the new genus concept (Staiger 2002; Lücking & al. 2009), we propose *Graphis nudanorsticta* as a new species and report *G. caribica* and *G. contortuplicata* as new records for China.

Materials & methods

Specimens were collected from Anhui and Guangxi Provinces, Southern China, and deposited in Lichen Herbarium of the College of Life Sciences, Liaocheng University, Shandong, China (LCU). Morphological and anatomical studies were conducted as described in Jia & Wei (2016).

Taxonomy

Graphis nudanorsticta Z.F. Jia & Q.D. Wang, **sp. nov.** Pl. 1

Fungal Name FN 570491

Differs from *Graphis pedunculata* by its smaller ascospores and corticolous thallus.

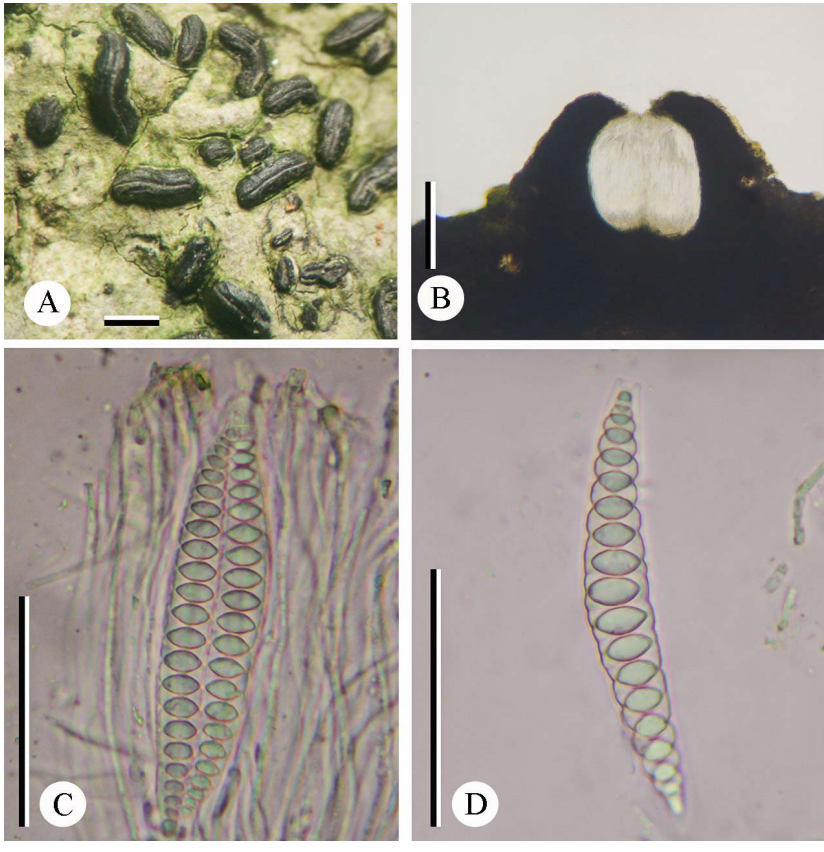

Plate 1. ***Graphis nudanorsticta*** (holotype, LCU: AH17106). A. Thallus with apothecia; B. Cross section of apothecium; C. Ascus containing ascospores; D. Ascospore. Scale bars: A = 1 mm; B = 100 μm; C, D = 50 μm.

Type: China. Anhui Province, Huangshan City, Mt. Huangshan, Yungu Temple, 30°07′N 118°10′E, alt. 1600 m, 18/VI/2017, Q.D. Wang AH17106 (**Holotype**, LCU).

Etymology: The epithet refers to the *nuda*-morph lirellae and the presence of norstictic acid.

Thallus crustose, yellow-green, rough, not smooth, tightly attached to the substratum, without isidia and soralia.

Apothecia lirelliform, short and unbranched, 0.5–3 mm long, 0.2–0.5 mm wide, black, scattered over the thallus, labia entire, disc concealed, lirellae prominent to sessile with basal thalline margin, *nuda*-morph; proper exciple conspicuous, completely carbonized; epithecium 15–25

µm tall, brownish; HYMENIUM hyaline, clear, 120–150 µm tall, paraphyses simple, 1–1.5 µm wide, slightly widened at apices; ASCI cylindrical to clavate, 80–110 × 15–35 µm, 2-spored; ASCOSPORES hyaline, ellipsoid, transversely septate, 16–22-locular at maturity, 65–100 × 8–15 µm, I+ violet, with halo and gelatinous caps.

CHEMISTRY: Norstictic acid (by TLC).

CORTICOLOUS.

ADDITIONAL SPECIMEN EXAMINED: **CHINA. ANHUI PROVINCE**, Huangshan City, Mt. Huangshan, Yungu Temple, 30°07′N 118°10′E, on bark, alt. 1250 m, 17/VI/2017, Q.D. Wang AH17022 (LCU).

REMARKS: *Graphis nudanorsticta* has similar morphology and chemistry to *G. pedunculata* Bungartz & Aptroot, which differs by having larger ascospores (130–210 × 22–27 µm) and preferring rock substrates (Lücking & al. 2009, Bungartz & al. 2010). The new species is also similar to *G. bifera* Zahlbr., which differs in the absence of norstictic acid. In the world key to *Graphis* (Lücking & al. 2009), *G. nudanorsticta* would key out at couplet 7, Group 8.

Graphis caribica Lücking, Phytotaxa 18: 59 (2011). PL. 2

THALLUS crustose, rough, yellow greenish, without isidia and soralia.

APOTHECIA lirelliform, elongate, conspicuous, black, simple or irregularly branched, 1–4 mm long, 0.3–0.5 mm wide, with basal thalline margin, labia striate (2–4), non-pruinose, *striatula*-morph; PROPER EXCIPLE apically carbonized; EPITHECIUM 10–20 µm tall, brownish; HYMENIUM hyaline, clear, 100–150 µm tall, paraphyses 1–1.5 µm diam, single, slightly inflated at apices; ASCI cylindrical to clavate, 90–105 × 15–25 µm, 8-spored; ASCOSPORES hyaline, ellipsoid, transversely septate, 10–16-locular, 40–65 × 6–9 µm, I+ violet, with thin halo.

CHEMISTRY: No lichen compounds detected by TLC.

CORTICOLOUS.

SPECIMENS EXAMINED: **CHINA. ANHUI PROVINCE**, Huangshan City, Mt. Huangshan, Banshan Temple, 30°07′N 118°10′E, alt. 1100 m, 18/VI/2017, Z.F. Jia AH17163, AH17164, AH17165 and AH17166 (all in LCU).

REMARKS: *Graphis caribica* is easily distinguishable from other striate labia species in China by its yellow-greenish thallus, clear hymenium, and transversely septate medium-sized ascospores. Prior to its formal description (Lumbsch & al. 2011), *G. caribica* was reported (as an unknown species) from Central America (Lücking & al. 2008, 2009).

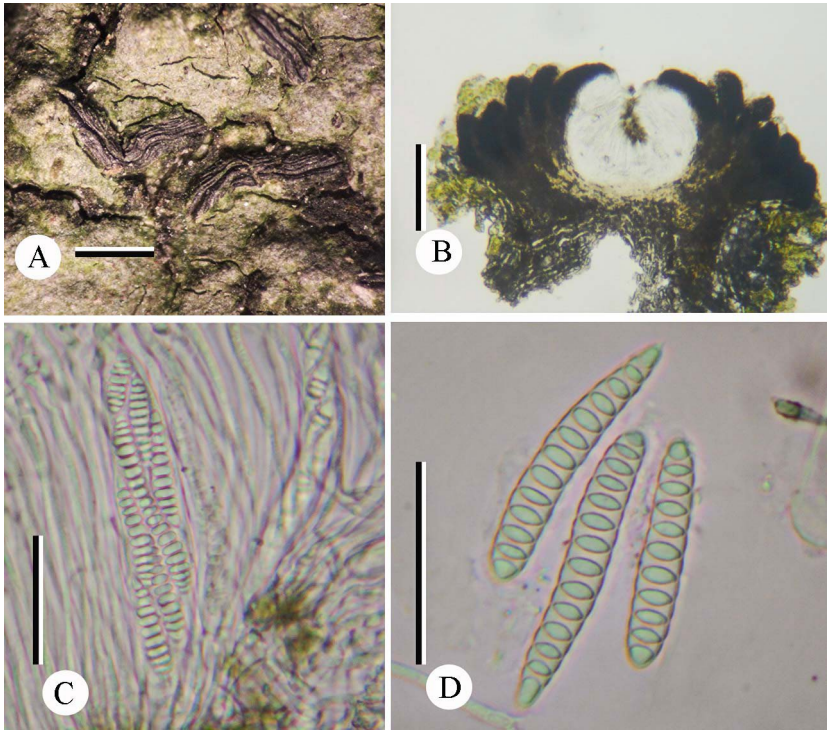

Plate 2. ***Graphis caribica*** (LCU: AH17163). A. Thallus with apothecia; B. Cross section of apothecium; C. Ascus containing ascospores; D. Ascospores. Scale bars: A = 1 mm; B = 100 µm; C = 50 µm; D = 30 µm.

Our Chinese materials appear identical to American material except for narrower ascospores (6–9 µm vs 9–12 µm diam).

Graphis contortuplicata Müll. Arg., J. Linn. Soc., Bot. 29: 225 (1892). Pl. 3

Thallus corticolous, crustose, greyish to pale grey, rough, not smooth, tightly attached to the substratum, without isidia and soralia.

Apothecia lirelliform, black, conspicuous, elongate, prominent to sessile, simple or rarely branched, 2–8 mm long, 0.2–0.3 mm wide, black, labia striate (2–4), non-pruinose, lirellae with basal thalline margin, *striatula*-morph; proper exciple completely carbonized; epithecium 15–25 µm tall, brownish; hymenium hyaline, clear, 110–140 µm tall, paraphyses 1.5–2.0 µm diam, single; asci cylindrical to clavate, 100–130 ×

Plate 3. ***Graphis contortuplicata*** (LCU: GX15437-b). A. Thallus with apothecia; B. Cross section of apothecium; C. Ascus containing ascospores; D. Ascospore. Scale bars: A = 1 mm; B = 100 μm; C, D = 50 μm.

15–25 μm, 2–8-spored; ascospores hyaline, ellipsoid, transversely septate, halo, 20–24-locular at maturity, 80–120 × 7.5–9 μm, I+ violet, with halo and gelatinous caps.

Chemistry: no lichen compounds detected by TLC.

Corticolous.

Specimens examined: **CHINA. Guangxi Province**, Wuming County, Mt. Damingshan, Natural Medicine Bath Valley, 33°29′N 108°26′E, alt. 1240 m, 21/V/2015, J. Li GX15437-b (LCU); Mt. Damingshan, Aixin Lawn, 23°30′N 108°26′E, alt. 1250 m, 22/V/2015, J. Li GX15506 (LCU).

Remarks: *Graphis contortuplicata,* easily distinguished from other striate labiate species in China by its conspicuous black elongate lirellae, completely carbonized exciple, and larger ascospores, is similar to *G. granulata* Fée, which differs in producing shorter lirellae and 1–2-spored asci. Some specimens of *G. contortuplicata* from India are described with laterally carbonized exciples (Awasthi & Singh 1975, Awasthi 1991, Lücking & al. 2009). Our Chinese materials match almost exactly previous descriptions except for the 2–8-spored asci (vs 2–4 ascospores per ascus in previous descriptions).

Acknowledgements

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